

Electronic Textile Antenna Technology

E-Textile Antennas Offer Low-Cost, Lightweight Solutions for the U.S. Military



Technology and Innovation

Traditional antennas are often rigid, bulky, and can be a limiting design factor when incorporated into military hardware. Applied Radar, Inc. (Applied Radar) has taken the traditional idea of what an antenna should be and transformed it for new applications. Under a DARPA SBIR, the company has developed innovative conductive fiber technology that allows antennas, feed lines, and other microwave structures to be incorporated into garments, tents, tarps, and composite reinforced laminates such as airframes and vehicle chassis. The idea migrated from a series of experimental benchmark prototypes to useful samples of interest to both military and commercial customers. Specific innovations included the use of nonwoven textile technology—calendering—to produce low-cost microwave structures, and the experimental use of 3-dimensional weaving. The company's technology provides value in two specific ways: 1) lower-cost, high-performance microwave and radar prototypes for conformable applications, and 2) rapid response to customer requests for new microwave products for operational use. They have a range of flexible wireless network antennas that are available for military and commercial applications.

Joint Collaborations

The successful development of Applied Radar's technologies required building a



Flexible Conductive Fiber Antenna

team of more than seven other companies, one university, and numerous suppliers. The team included a group of university researchers, industrial embroiderers and weavers, machine suppliers, and manufacturers of composite-based aircraft. DARPA and the U.S. Air Force were instrumental in helping Applied Radar establish collaborative relationships with these and other organizations.

The technology developed under this SBIR is being transitioned to a large military prime contractor where it promises to be a key element in a new generation of Air Force composite airframes for reconnaissance aircraft. Applied Radar's work on this project has also helped them secure new contracts for more conventional radar projects.

Lessons Learned

- Be sure the customer knows that the company is serious about the work and capable of getting it done.
- Develop usable technology in addition to performing innovative research. Experiments and prototypes must lead to real applications.
- Even though a particular application may not be “in favor,” keep it close by. It may have future potential.
- Demonstrate a high level of technical competence, especially to DARPA, and have an innovative idea that can be applied to a near-term military need.

Economic Impact

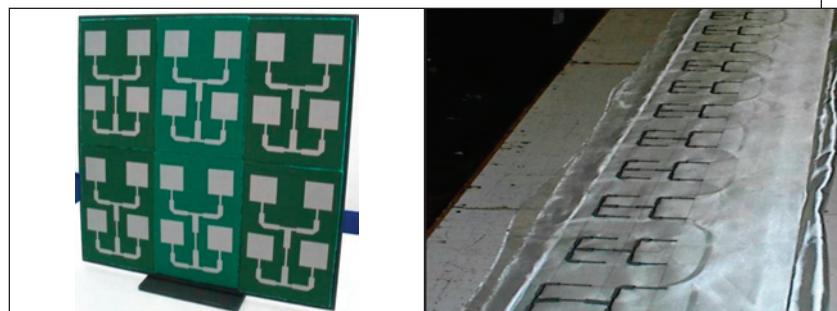
The U.S. textile industry is facing an extraordinary challenge from off-shore competitors. Conductive fiber techniques are a way to leverage the industry into new, high-value product lines that can provide a competitive, time-to-market advantage. The company’s unique electronic textile antenna technology has been provided directly to two military customers. It is now being transitioned to a prime contractor under a license agreement.

Having a DARPA SBIR contract helped Applied Radar secure bank loans and additional contracts with the Army and Air Force. The SBIR also indirectly benefited the company’s textile industry subcontractors, which are themselves small, U.S.-based businesses facing intense foreign competition. As a direct result of the DARPA SBIR project, Applied Radar has filed four provisional patent applications and is currently working on its fourth regular patent application.

About the Company

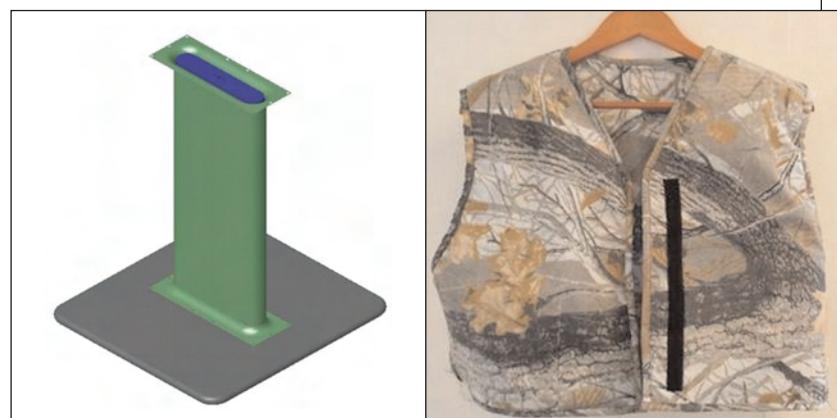
Applied Radar, Inc.—founded in 1998 by Dr. William Weedon—is headquartered in North Kingstown, Rhode Island. The company serves the U.S. Army, Navy, Air Force, and U.S. Special Operations Command (SOCOM).

Applied Radar was originally a consulting company focused on delivering technical services in microwave systems development. This initial consulting work was later augmented with SBIR funding, and since then the focus has shifted more to product development. ■



Lightweight Scalable Arrays

Composite Airframe Microwave Test Panel



A-160 Antenna

Vest with liner patch antenna

Company Information

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President
Founded: 1998
Number of employees: 23